

## **NEPA COMPLIANCE GUIDANCE**

### **May 8, 2003**

The National Environmental Policy Act (NEPA) of 1969 requires Federal agencies to consider the environmental impacts of a project in their decision making process. To comply with NEPA and associated regulations, NASA has prepared an Environmental Assessment (EA) for “routine payloads” (nearly all of Goddard’s missions) launched on ELV’s from KSC or Vandenberg. For such missions, this global EA eliminates the necessity of developing a unique EA for each mission.

Lizabeth Montgomery of the Safety and Environmental Branch has taken on the job of developing the NEPA Compliance packages for routine payloads. To start the process, all you have to do is contact Beth (6-0469) in order to get a set of checklists which will be used to determine whether your mission qualifies for routine payload status. This should be determined before the end of Phase A.

If your mission does qualify for routine payload status, Beth will pull together the NEPA Compliance package and route it for signature. The following pages provide an example of a complete NEPA Compliance package (for the SORCE mission).

If your mission does not qualify as a routine payload, Beth will provide guidance to help you through the NEPA compliance process. You should refer to the Environmental Assessment guidance provided in the Documents section of the Code 400 home page. If you have any questions regarding this guidance package, please contact Jim Greaves at 6-7625.

## MEMORANDUM FOR THE RECORD

**National Environmental Policy Act (NEPA) Compliance for Solar Radiation & Climate Experiment (SORCE)****1.0 Introduction**

The NEPA of 1969, as amended (42 U.S.C. 4321 *et seq.*), requires Federal agencies to consider the environmental impacts of a project in their decision making process. To comply with NEPA and associated regulations (the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA [40 CFR 1500-1508] and NASA policy and procedures [14 CFR Part 12160]), NASA has prepared an Environmental Assessment (EA) for routine payloads launched on Expendable Launch Vehicles (ELV's) from Cape Canaveral Air Force Station (CCAFS) and Vandenberg Air Force Base (VAFB) (Ref: *Final Environmental Assessment for Launch of NASA Routine Payloads on Expendable Launch Vehicles from Cape Canaveral Air Force Station, Florida and Vandenberg Air Force Base, California*, June 2002). The EA assesses the environmental impacts of missions launched from CCAFS and VAFB with spacecraft that are considered routine payloads.

Spacecraft defined as routine payloads would utilize materials, quantities of materials, launch vehicles and operational characteristics that are consistent with normal and routine spacecraft preparation and flight activities at VAFB, CCAFS, and the Kennedy Space Center. The environmental impacts of launching routine payloads from VAFB and CCAFS fall within the range of routine, ongoing and previously documented impacts that have been determined not to be significant. Spacecraft covered by this EA meet specific criteria ensuring that the spacecraft, its operation and decommissioning do not present any new or substantial environmental or safety concerns.

To determine the applicability of a routine payload classification for a mission launched from VAFB and CCAFS and coverage under the NASA routine payload EA, the mission is evaluated against the criteria defined in the EA using the Routine Payload Checklist (RPC).

**2.0 Mission Description**

The SORCE mission consists of a small, free flying satellite carrying four instruments. The purpose of the mission is to obtain precise measurements of the solar radiation at the

top of the Earth's atmosphere. SORCE will be launched on a Pegasus XL launch vehicle into a 640 kilometer, 40° orbit from CCAFS in the 4<sup>th</sup> Quarter 2002.

Solar radiation is the dominant, direct energy input into the terrestrial ecosystem; and it affects all physical, chemical, and biological processes. The sun provides natural influence on the Earth's atmosphere and climate. In order to understand mankind's role in climate change, the Sun's impact must first be understood. Data obtained from the SORCE experiment will be used to model the Sun's output and to explain and predict the effect of the Sun's radiation on the Earth's atmosphere and climate. SORCE specifically addresses issues of long-term climate change, natural variability and enhanced climate prediction, and atmospheric ozone and UV-B radiation.

The spacecraft weighs 286 kilograms, and measures 158 centimeters in height and 115 centimeters in diameter. Electrical power to the spacecraft and instruments will be provided by six gallium arsenide solar arrays and a nickel-hydrogen battery. The four SORCE instruments are the Total Irradiance Monitor (TIM), Solar Stellar Irradiance Comparison Experiment (SOLSTICE), Spectral Irradiance Monitor (SIM), and the XUV Photometer System (XPS).

The components utilized in the SORCE spacecraft and instruments are made of materials normally encountered in the space industry. SORCE does not use any radioactive materials or lasers. SORCE does not carry any pathogenic organisms or materials extremely hazardous to human health, nor will SORCE return samples to Earth.

### **3.0 NASA Routine Payload Determination**

The SORCE mission has been evaluated against the NASA routine payload EA for launches from CCAFS and VAFB, using the RPC (see enclosed Evaluation Recommendation Package). The evaluation indicates that the mission meets the criteria for a routine payload. The mission does not present any unique or unusual circumstances that could result in new or substantial environmental impacts. Based on this review, it is determined that the SORCE mission qualifies as a routine payload and falls within the scope of the reference routine payload EA. No additional NEPA action or documentation is required.

A. V. Diaz

Enclosure

cc:

400/Ms. D. Perkins

420/Mr. P. Sabelhaus

420/Mr. W. Schiavone

426/Mr. W. Ochs

**EVALUATION RECOMMENDATION PACKAGE**

**Record of Environmental Consideration  
Routine Payload Checklist  
NEPA Environmental Checklist**

Enclosure

# RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: **SORCE Solar Radiation and Climate Experiment**
2. Description/location of proposed action:  
The SORCE mission consists of a small, free flying satellite carrying four instruments to measure solar radiation incident at the top of the Earth's atmosphere. The satellite will be launched on a Pegasus XL from CCAFS.
- Date and/or Duration of project: Launch 4<sup>th</sup> Q 02
3. It has been determined that the above action:
- X a. Is adequately covered in an existing EA or EIS.  
Title: Final Environmental Assessment for Launch of NASA Routine Payloads on ELVs from CCAFS, Florida and VAFB, California  
Date: June 2002
- b. Qualifies for Categorical Exclusion and has no special circumstances which would suggest a need for and Environmental Assessment.  
Categorical Exclusion: \_\_\_\_\_
- c. Is exempt from NEPA requirements under the provisions of:  
\_\_\_\_\_
- d. Is covered under EO 12114, not NEPA.  
\_\_\_\_\_
- e. Has no significant environmental impacts as indicated by the results of an environmental checklist and/or detailed environmental analysis.  
(Attach checklist or analysis as applicable)
- f. Will require the preparation of an Environmental Assessment.
- g. Will require the preparation of an Environmental Impact Statement.
- h. Is not federalized sufficiently to qualify as a major federal action.

NEPA Coordinator, Code 205.2

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Date

Project Manager, Code\_\_\_\_\_

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Date

### NASA Routine Payload Checklist (1 of 2)

PROJECT NAME: Solar Radiation & Climate Experiment DATE OF LAUNCH: 12/1/02  
 PROJECT CONTACT: Bill Ochs PHONE NUMBER: 301-286-2875 MAILSTOP: 426  
 PROJECT START DATE: Confirmed 8/99 PROJECT LOCATION: Managed from GSFC  
 PROJECT DESCRIPTION: Measures total and spectral solar irradiance

<b>A. SAMPLE RETURN:</b>	YES	NO
1. Would the candidate mission return a sample from an extraterrestrial body?		<b>X</b>
<b>B. RADIOACTIVE SOURCES:</b>	YES	NO
1. Would the candidate spacecraft carry radioactive materials?		<b>X</b>
2. If Yes, would the amount of radioactive sources require launch approval at the NASA Associate Administrator level or higher according to NPG 8715.3 (NASA Safety Manual)?		
Provide a copy of the Radioactive Materials Report as per NPG 8715.3 Section 5.5.2.		
<b>C. LAUNCH AND LAUNCH VEHICLES:</b>	YES	NO
1. Would the candidate spacecraft be launched using a launch vehicle/launch complex combination other than those indicated in Table 1 below?		<b>X</b>
2. Would the proposed mission cause the annual launch rate for a particular launch vehicle to exceed the launch rate approved or permitted for the affected launch site?		<b>X</b>
Comments:		
<b>D. FACILITIES:</b>	YES	NO
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?		<b>X</b>
2. If Yes, has the facility to be modified been listed as eligible or listed as historically significant?		
Provide a brief description of the construction or modification required:		
<b>E. HEALTH AND SAFETY:</b>	YES	NO
1. Would the candidate spacecraft utilize any hazardous propellants, batteries, ordnance, radio frequency transmitter power, or other subsystem components in quantities or levels exceeding the Envelope Payload characteristics (EPCs) in Table 2 below?		<b>X</b>
2. Would the candidate spacecraft utilize any potentially hazardous material as part of a flight system whose type or amount precludes acquisition of the necessary permits prior to its use or is not included within the definition of the Envelope Payload (EP)?		<b>X</b>
3. Would the candidate mission release material other than propulsion system exhaust or inert gases into the Earth's atmosphere or space?		<b>X</b>
4. Would launch of the candidate spacecraft suggest the potential for any substantial impact on public health and safety?		<b>X</b>
5. Would the candidate spacecraft utilize a laser system that does not meet the requirements for safe operation (ANSI Z136.1-2000 and ANSI Z136.6-2000)? For Class III-B and IV laser operations, provide a copy of the hazard evaluation and written safety precautions (NPG 8715.3).		<b>X</b>
6. Would the candidate spacecraft contain pathogenic microorganisms (including bacteria, protozoa, and viruses) which can produce disease or toxins hazardous to human health?		<b>X</b>
Comments:		

continued on next page

### NASA Routine Payload Checklist (2 of 2)

PROJECT NAME: Solar Radiation & Climate Experiment DATE OF LAUNCH: 12/1/02  
 PROJECT CONTACT: Bill Ochs PHONE NUMBER: 301-286-2875 MAILSTOP: 426  
 PROJECT START DATE: Confirmed 8/99 PROJECT LOCATION: Managed from GSFC  
 PROJECT DESCRIPTION: Measures total and spectral solar irradiance

<b>F. OTHER ENVIRONMENTAL ISSUES:</b>	YES	NO
1. Would the candidate spacecraft have the potential for substantial effects on the environment outside the United States?		<b>X</b>
2. Would launch and operation of the candidate spacecraft have the potential to create substantial public controversy related to environmental issues?		<b>x</b>
Comments:		

**Table 1: Launch Vehicles and Launch Pads**

Launch Vehicle	Eastern Range (CCAFS Launch Complexes)	Western Range (VAFB Space Launch Complexes)
Atlas IIA & AS	LC-36	SLC-3
Atlas IIIA & B	LC-36	SLC-3
Atlas V Family	LC-41	SLC-3
Delta II Family	LC-17	SLC-2
Delta III	LC-17	N/A
Delta IV Family	LC-37	SLC-6
Athena I & II	LC-46 or -20	California Spaceport
Taurus	LC-46 or -20	SLC-576E
Titan II	N/A	SLC-4W
Pegasus XL	CCAFS skidstrip KSC SLF	VAFB airfield

**Table 2: Summary of Envelope Spacecraft Subsystems and Envelope Payload Characteristics (EPC)**

Structure	<b>Unlimited:</b> aluminum, magnesium, carbon resin composites, and titanium <b>Limited:</b> beryllium [50 kg (110 lb)]
Propulsion	Mono- and bipropellant fuel; 1000 kg (2200 lb) (hydrazine); 1000 kg (2200 lb) (monomethylhydrazine) Bipropellant oxidizer; 1200 kg (2640 lb) (nitrogen tetroxide) Ion-electric fuel; 500 kg (1100 lb) (Xenon) SRM; 600 kg (1320 lb) (AP)-based solid propellant
Communications	Various 10-100 W (RF) transmitters
Power	Solar cells; 150 A-Hr (Ni-H <sub>2</sub> ) battery; 300 A-Hr (LiSOC) battery; 150 A-Hr (NiCd) battery
Science instruments	10 kW radar ANSI safe lasers (Section 4.1.2.1.3)
Other	Class C EEDs for mechanical systems deployment Radioisotopes limited to quantities that are approved for launch by NASA Nuclear Flight Safety Assurance Manager Propulsion system exhaust and inert gas venting

## **NEPA Environmental Checklist**

### **1. Project/Program**

Solar Radiation and Climate Experiment (SORCE)

### **2. Points of Contact**

Project Manager: Bill Ochs Code: 426 Telephone: x62875

S/C Manager: \_\_\_\_\_ Code: \_\_\_\_\_ Telephone: \_\_\_\_\_

Instrument Manager: \_\_\_\_\_ Code: \_\_\_\_\_ Telephone: \_\_\_\_\_

Other: \_\_\_\_\_ Code: \_\_\_\_\_ Telephone: \_\_\_\_\_

### **3. Schedule**

Formulation Process (Phase A/B): Completed

Implementation Process (Phase C/D): Phase D will begin 3/1/02

Launch Date: 7/31/02 LRD is slipping to 11/30/02

Other Milestone Dates: \_\_\_\_\_

### **4. Current status**

The SORCE BUS will be completed in early February. The instruments integrated onto the optical bench will be shipped 2/28 to begin Observatory I&T.

### **5. Project Description**

Purpose: To measure total and spectral solar irradiance.

Spacecraft/Instruments: Total Irradiance Monitor (TIM), Spectral Irradiance Monitor (SIM), Solar/Stellar Irradiance Comparison Experiment (SOLSTICE), Extreme UV Photometer System (XPS)

Launch Vehicle: Pegasus XL

Launch Site: KSC

Participants/Locations: University of Colorado's Laboratory for Atmospheric and Space Physics, Orbital Sciences Corp. Space Systems Group and Launch Services Group, and KSC

Mission Life: 5 years (6 year goal)

End of mission, Re-entry: Based on the ODA, re-entry will occur 22.8 years after launch, which is within the 25 year after end of mission requirement. The s/c will reenter relying on atmospheric drag to cause the gradual decay of the orbit.

### **6. Is there anything controversial about the mission?**

No



**7. Is there anything unique, unusual, exotic about the mission, spacecraft, and instruments?**

No

**8. Is there any environmental (NEPA) documentation for spacecraft, launch vehicle?**

An environmental impact assessment was performed for Pegasus at VAFB which applies to KSC.CCAFS. The document is entitled "Environmental Assessment for the Orbital Science Corp. Commercial Launch Services Program at VAFB, California, dated 21 December 1992. Additional NEPA documentation includes the EOS Program Environmental Assessment.

**9. Does the mission include or involve:**

Check all that apply. If uncertain indicate with a "?"

For all that apply provide an explanation. Use the additional page if needed.

- ☒ a. Fuels Only on the L/V
- ☐ b. Radioactive Material
- ☐ c. Explosives
- ☐ d. Chemicals
- ☐ e. Hazardous Materials/Substances
- ☐ f. Lasers (Class, Earth Pointing)
- ☐ g. Disease Producing Pathogenic Microorganisms
- ☐ h. Construction of a New Facility
- ☐ i. Discharges of any substances into air, water, or soil
- ☐ j. Generation/Use/Storage/Disposal of Toxic or Hazardous Substances
- ☐ k. Generation of Hazardous Wastes
- ☐ l. Generation of High Noise Levels
- ☐ m. Sample Return to Earth
- ☐ n. Generation of Ionizing or Nonionizing Radiation
- ☐ o. Impact on Local Social or Economic Conditions
- ☐ p. Removal of Vegetation or Destruction of Habitat
- ☐ q. Impact/Affect on Minority or Low Income Populations
- ☐ r. Affect Any Threatened or Endangered Species
- ☐ s. Affect Areas of Historical or Cultural Significance
- ☐ t. New or Foreign Launch Vehicle
- ☐ t. Other Issues of Potential Environmental Impact

**10. Has an Air Force Form 813 been completed? (Please attached copy)**

No

Project Manager, Code  
Explanations for Question 9.

Date

Additional Information:

The launch vehicle integration will occur in two phases. The Pegasus XL will be assembled at VAFB in Ca. Upon completion, the Pegasus will be ferried via the L-1011 to CCAFS in FI. The Pegasus will be de-integrated from the L-1011 and the SORCE satellite will be integrated into the Pegasus. Once integration is completed, the Pegasus will be re-integrated to the L-1011. The L-1011 will take off from CCAFS and will launch the Pegasus at the designated drop box over the Atlantic Ocean.

The SORCE satellite will be disposed of on-orbit by relying on atmospheric drag to cause the gradual decay of the orbit, resulting in burn-up in the atmosphere during re-entry. Based on the Orbital Debris Analysis, SORCE will reenter 16.8 years after the completion of its mission which is within the 25 year requirement. The casualty area for SORCE is  $2.36\text{m}^2$  which is with the  $8\text{m}^2$  requirement. The entire SORCE bus will burn up upon reentry and 3 instrument components will fail to burn up during reentry. The three instrument components include the instrument case ( $1.083\text{ m}^2$ ), the TIM internal baffle ( $0.682\text{ m}^2$ ) and the TIM Vacuum Pressure Assembly ( $0.6\text{ m}^2$ ).